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WHAT IS AN "ACQUIRED CHARACTER?"

By C. C. Nutting.[1]

During the discussion of an exceedingly interesting paper on the "Heredity of Acquired Characters," read before the Biological Section of the American Association for the Advancement of Science at its recent meeting, one of the members had the temerity to confess that he was not sure that he knew the exact nature of an "acquired character;" and it was noticeable that none of the noted biologists present on that occasion accepted the implied challenge by an attempt to define the expression which constituted the basis of the debate in which they were engaged. Perhaps it seemed unnecessary to define words that have of late been so prominently and persistently before the biological world. Doubtless most of the persons present, and honesty demands that I count myself among them, felt perfectly competent to give the desired definition; but after a re-survey of the controversy, which has of late made such an unusual demand upon printer's ink, it has become evident to me that the meaning of "acquired character" is elastic to an amazing degree, capable of marvellous contraction or expansion to suit the individual needs of any and all controversialists, be they NeoDarwinian or NeoLamarckian.

But the contractibility of the term is the phenomenon most apt to excite the admiration of the unbiased observer. Weismann himself, the great founder and able exponent of NeoDarwinism, has demonstrated this contractibility along with his exposition of the continuity of the germ-plasm. He says:

"If every new character is said to be 'acquired,' the term at once loses its scientific value, which lies in the restricted use." ——"Science has always claimed the right of taking certain expressions and applying them in a special sense, and I see no

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reason why it should not exercise this right in the case of the term 'acquired.'"[2]

"It is certainly necessary to have two terms which distinguish sharply between the two chief groups of characters—the primary characters which first appear in the body itself, and the secondary ones which owe their appearance to variations in the germ, however such variations may have arisen."

He calls the former acquired or "*somatogenic*," and the latter "*blastogenic*," and maintains that "the *somatogenic* characters cannot be transmitted," or, rather, that "those who assert that they can bė transmitted must furnish the requisite proofs." "The *somatogenic* characters not only include the effects of mutilation, but the changes which follow from increased or diminished performance of function, and those which are directly due to nutrition and any of the other external inflences which act upon the body."[3]

Here, then, we have Prof. Weismann's definition of acquired characters which are not transmitted, and it would seem to be sufficiently definite. Now, note the process of contraction. Speaking of the source of the variation in the germ, he says:

"I believe, however, that they (the variations) can be referred to the various external influences to which the germ is exposed before the commencement of embryonic development. Hence we may fairly attribute to the adult organism influences which determine the phyletic development of its descendants. For the germ cells are contained in the organism, and the external influences which affect them are intimately connected with the state of the organism in which they lie hid."[4]

Professor Weismann, by the way, concedes that a *quantitative* variation of the germ is thus brought about. "I must confess my inability to see why this variation is not *qualitative* as well."

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[2] Essays upon Heredity, August Weismann. Page 425.

[3] According to this definition, the increased toleration of a high temperature, shown by the bacteria in Dr. Dallinger's experiments, would be an acquired character, and that this character was transmitted was experimentally proven. In the discussion of the paper, however, Prof. Morse claimed that the toleration of unwonted temperature was due to *natural selection, pure and simple,* a position which it is not the purpose of this article to combat. A forcible illustration of the difficulty treated of in the following pages.

[4] Essays on Heredity, Weismann. Page 105.

Are not the qualities of organs and tissues affected by external conditions, such as quality of food, temperature, etc.? What justification can be found for maintaining that the germ cell is the only cell in the body not thus affected, after having admitted that quantitative effects are thus produced? This concession of a quantitative modification of the germ cell by external conditions, acting through the soma, throws the burden of proof that *qualitative modifications are not likewise effected* entirely on the NeoDarwinian side of the controversy.

But these determining causes which "modify the phylogeny of descendants," and hence the descendants themselves, produce modifications which Professor Weismann considers "blastogenic,"[5] although expressly described as acting by external stimuli through the soma. Hence the Lamarckians cannot use any examples of the manifest of modifications brought about in this way, as, although the changes brought about are *somatogenic* by definition, they are *blastogenic* by the *a priori* NeoDarwinian argument. In other words, as soon as a somatogenic variation is inherited it is immediately relegated to the list of blastogenic variations by the NeoDarwinians.

The argument could be put in this way, according to Weismann. "The obvious means by which all inheritance of all transmitted peculiarities takes place is the continuity of the germ plasm."

Any peculiarity thus inherited is blastogenic.

Ergo, any peculiarity which is inherited is blastogenic. As soon as any character, however obviously acquired, is proven by the Lamarckians to be inherited, the NeoDarwinians complacently pronounce that character blastogenic, or not acquired. And so it comes to pass that no acquired character can satisfy the requirements of the case, if that character is so unfortunate as to be transmitted.

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[5] "We have an obvious means by which the inheritance of all transmitted peculiarities takes place, in *the continuity of the substance of the germ-cells or germ-plasm*." (Weismann) P. 105.

A large number of concrete examples of this phenomenon can be found in the works of Weismann and his followers.

A cow which lost its left horn by suppuration afterward produced two calves with a rudimentary left horn in each case. The loss of the horn would certainly be supposed to be an acquired character, but this character was transmitted to two calves, and thus becomes blastogenic to suit the argument. "The loss of the cow's horn may have arisen from a congenital malformation,"[6] and is, therefore, not an acquired character. How a malformation, *due to suppuration,* can be *congenital* is a question not at all considered. The needs of the NeoDarwinian school demand that this malformation be congenital, and therefore a congenital malformation it is.

The young pointer dog, untrained and without any example to imitate, springs forward, barking, at the first report of a gun. "This," say the Lamarckians, "is surely the inheritance of an acquired character;" but, no:—The dog has simply "inherited a reflex mechanism, which impels him to start forward on hearing a report,"[7] instead of running away at full yelp as a common cur would do.

A cat was said to have lost her tail by a cart running over it, and her progeny were tailless. This would seem to be a clincher, but "they, (the rudimentary tails) might have been transmitted from the unknown father."[8]

A soldier loses his left eye by inflammation fifteen years before marriage, and afterward has two sons with defective left eyes. A case of inheritance of an acquired character? Not a bit of it. "The soldier did not lose his left eye because it was injured, but because it was predisposed to become diseased from the beginning!"[9]

A boy's thumbs are malformed by chilblains, associated with some skin disease. Two of his children and two grandchildren have malformed thumbs on both hands. Here we would feel reasonably certain that our search for an acquired character has been at last rewarded; but no;—"A high degree of susceptibility of the skin of the thumb was obviously innate in the father, and this "*susceptibility*" was what was "certainly transmitted, and led to the similar malformation of the thumbs of the children."[10]

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[6] Essays on Heredity. (Weismann) P. 82.

[7] Essays on Heredity. (Weismann) Page 94.

[8] Essays on Heredity. (Weismann) Page 439.

[9] Essays on Heredity. (Weismann) Page 451.

Artificially produced epilepsy in guinea pigs was inherited by the descendants to the fifth generation, but, "it is easy to imagine that the passage of some specific organism (from the lesion made by the division of the sciatic nerve!) through the reproductive cells may take place."[11]

Westphal produces inheritable epilepsy by blows upon the head, and Ziegler asks if the guinea-pigs operated on "may not have been already predisposed to disease?"[12]

But enough examples have been given to demonstrate that acquired characters, however evident they may be to all but the NeoDarwinians, have the convenient property of becoming blastogenic, or not acquired, whenever they are proved to be transmitted.

To what, then, shall we liken an acquired character? To an unstable chemical compound, a vanishing quantity, a will-o'-the-wisp, a name to conjure with! And the Neo-Lamarckians are but children chasing rainbows, which are conjured away in smiling complacency by the wise NeoDarwinians of this generation.

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[10] Essays on Heredity. (Weismann) Page 451.

[11] Essays on Heredity. (Weismann) Page 82.

[12] Organic Evolution. (Eimer) Page 182.